
Space Weather Forecast

Issued on Sunday, 19 February 2023 at 01:26 Local

This forecast provides a four day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales <https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales>

Space Weather Forecast Headline: Chance of Moderate flares with an ongoing Strong flare potential. Coronal Mass Ejection arrivals possible day 1 and 2 (19th and 20th), with G1/Minor Geomagnetic Storms likely.

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Low with only common class flares observed. There are eight sunspot regions on the disc, the most notable is in the northeast disc which is still recovering from its strong flare on the 17th. The visual appearance of the group is relatively straightforward, although ongoing growth and some magnetic complexity suggests the potential further flaring. There are a total of eight sunspot regions on the visible solar disc. The other notable regions include a moderately sized group in the northwest that also showed some increasing complexity, although this remained inactive, and another smaller group in the southwest that also showed some growth. The other regions are generally mature and stable. A couple of coronal mass ejections (CMEs) were observed on the 18th however these are not Earth-directed.

Solar Wind / Geomagnetic Activity: Solar winds remained slightly elevated throughout, varying between 420 and 460 km/s. The total strength of the interplanetary magnetic field was Weak, with its north-south component also only varying weakly. Geomagnetic activity was Quiet (Kp 1-2).

Energetic Particles / Solar Radiation: The count rate of energetic particles (high energy protons) was at background levels with no solar radiation storms observed.

Four-Day Space Weather Forecast Summary

Solar Activity: Low to Moderate activity expected, with an ongoing chance of isolated M-flares (R1/R2 Radio Blackouts), but also a lower chance of rising again to High with further strong flares. The main risk for further significant flaring is the sunspot in the northeast that produced the strong flare on the 17th.

Solar Wind / Geomagnetic Activity: CMEs from the 15th and 16th have potentially missed, or been slower and consequently will be less impactful than previous forecast. These still have the potential for a late arrival, perhaps together, early on day 1 (19th). A further fast CME associated with the strong flare on the 17th has been assessed to have an Earth-directed component, although most of the material of the CME will miss. This is anticipated to arrive on day 2 (20th), however there is sufficient uncertainty that an earlier arrival on day 1 (19th) cannot be ruled out. The impact of any arrival is low confidence. Generally Quiet activity is expected with Unsettled intervals. However, CME arrivals will likely bring a period of Active, with a chance of G1/Minor Storms, perhaps reaching G2/Moderate storm with the arrival of the strong-flare CME.

Energetic Particles / Solar Radiation: The count rate of energetic particles (high energy protons) is most likely to remain at background levels, but with a slight chance of rising and exceeding the S1/Minor Storm level in response to any larger flares.

Geomagnetic Storms:

Geo-Magnetic Storm	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC)	Day 2 (00-24 UTC)	Day 3 (00-24 UTC)	Day 4 (00-24 UTC)
Probability (Exceedance)			(%)	(%)	(%)	(%)
Minor or Moderate	G1 to G2	No	40	60	20	10
Strong	G3	No	5	5	1	1
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

Radio Blackouts - X Ray Flares:

X Ray Flares	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC)	Day 2 (00-24 UTC)	Day 3 (00-24 UTC)	Day 4 (00-24 UTC)
Probability			(%)	(%)	(%)	(%)
Active	R1-R2 M Class	No	60	50	40	40
Very Active	R3 to R5 X	No	25	20	10	10

Solar Radiation Storms - (High Energy Protons):

Radiation Storms	Level (cm ⁻² sr ⁻¹ s ⁻¹)	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC)	Day 2 (00-24 UTC)	Day 3 (00-24 UTC)	Day 4 (00-24 UTC)
Probability (Exceedance)			(%)	(%)	(%)	(%)
Active	≥ S1	No	15	10	5	5
Very Active	≥ S3 *	No	1	1	1	1

* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = cm⁻²sr⁻¹s⁻¹)